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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numeric Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is also included. (RC)

Technical Report on Development of USES Aptitude Test Battery

For

Fork-Lift-Truck Operator (any ind.) 922.883

S-131R74

Developed in Cooperation with the
Arkansas, California, Florida, Illinois, Kentucky, Michigan,
Missouri, New Jersey, South Carolina, Texas and Wisconsin
State Employment Services

Manpower Administration
U. S. Department of Labor

August 1974

Development of USES Specific Aptitude Test Battery S-131R74

For

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RESEARCH SUMMARY

This report describes the research which resulted in the development of the following Specific Aptitude Test Battery for use in selecting inexperienced or untrained individuals for training as Fork-Lift-Truck Operators:

Aptitudes	Cutting Scores
S - Spatial Aptitude	70
K - Motor Coordination	80

Sample:
201 males and one female employed as Fork-Lift-Truck Operators by various companies (see Appendix 1). A total of 107 were minority group members (91 Blacks, 14 Spanish Surnamed, 1 Oriental, 1 French Canadian) and 95 were nonminority group members. The geographic distribution is shown in Table 1.

TABLE 1

Ceographic Distribution

	Minority	Non-minority	States
North	56	51	Illinois, Michigan, Missouri, New Jersey, Wisconsin
South	45	24	Arkansas, Florida, Kentucky, South Carolina, Texas
West	6	20	California
Total	107	95	

Criterion:
Supervisory ratings. Criterion data were collected between 1969 and 1973.

Design:
Concurrent (test and criterion data were collected at approximately the same time).

Concurrent Validity:
Phi coefficient for total sample = .24 (P/2 < .0005)
Phi coefficient for minority subsample = .20 (P/2 < .025)
Phi coefficient for the Black subsample = .18 (P/2 < .05)
Phi coefficient for nonminority subsample = .19 (P/2 < .05)

Effectiveness of Battery for Total Sample:
For the total sample, 63% of the nontest-selected individuals used for this study were in the high criterion group; if they had been test-selected 71% would have been in the high criterion group. 37% of the nontest-selected individuals used for this study were in the low criterion group; if they had been test-selected 29% would have been in the low criterion group. The effectiveness of the battery is shown in Table 2.

TABLE 2

Effectiveness of Battery for Total Sample

	Without Tests	With Tests
High Criterion Group	63%	71%
Low Criterion Group	37%	29%

Comparison of Minority and Nonminority Groups:
No differential validity for this battery was found. The difference between phi coefficients for minority and nonminority groups is not statistically significant (CR = .07). The battery is fair to minority group members since the proportion of minority group members who met the cutting scores equaled the proportion who were in the high criterion group; 56% of the minority group members met the cutting scores; 56% were in the high criterion group.

The difference between the phi coefficients for Black and nonminority groups is not statistically significant (CR = .07). The battery is fair to Blacks, since the proportion of Blacks who met the cutting scores approximated the proportion who were in the high criterion group; 52% of the Blacks met the cutting scores and 55% were in the high criterion group.

JOB ANALYSIS

A job analysis was performed by observation of the workers' performance on the job and in consultation with the workers' supervisors. On the basis of the job analysis, the job description shown in Appendix 3 was prepared which was used to (1) select an experimental sample of workers who were performing the job duties; (2) choose an appropriate criterion or measure of job performance; (3) determine which aptitudes are critical, important, or irrelevant to job performance (see Tables 3 and 7); and (4) provide information on the applicability of the test battery resulting from this research.

TABLE 3

Qualitative Analysis
Based on the job analysis, the aptitudes indicated appear to be important to the work performed

Aptitude	Rationale
S - Spatial Aptitude	Required in picking up, transporting, unloading and stacking of materials.
Q - Clerical Perception	Required in checking gauges accurately and in identification of parts.
K - Motor Coordination	Required to coordinate eyes and hands rapidly in making precise movements with speed in operation of vehicle.
F - Finger Dexterity	Required to move fingers swiftly and accurately in operating levers on trucks.
M - Manual Dexterity	Required to move arms and hands swiftly and accurately in operating levers on trucks.

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002B were administered during the period of 1969 through 1973.

CRITERION

The immediate supervisor rated each worker. The ratings were obtained by means of personal visits of State test development analysts who explained the rating procedure to the supervisors. Two ratings were obtained from each supervisor with an interval of two weeks between the ratings. Since sample members' test scores are confidential, supervisors were not aware of the individual's test performance at the time the ratings were completed. All supervisors were nonminority group members.

A descriptive rating scale was used. The scale (see Appendix 2) consists of 6 items. Five of these items cover different aspects of job performance. The sixth item is a global item on the Fork-Lift-Truck Operator's "all-around" ability. Each item has five alternatives corresponding to different degrees of job proficiency. For the purpose of scoring the items, weights of 1 to 5 were assigned to the responses. The total score on the rating scale is the sum of the weights for the six items. The possible range for each rating is 6-30.

A review of the job description indicated that the subjects covered by the rating scale were directly related to important aspects of job performance:

A. Amount of work: Fork-Lift-Truck Operator must efficiently move materials from one location to another designated location.

B. Quality of work: Fork-Lift-Truck Operator must be able to move materials without spilling the materials or otherwise damaging them.

C. Accuracy of work: Fork-Lift-Truck Operator must accurately transport materials to the location specified in the movement instructions.

D. Amount of knowledge: Fork-Lift-Truck Operator must know the capacity of various sizes of fork-lift trucks and proper way to pick up, transport, unload and stack materials.

E. Variety of job duties: Fork-Lift-Truck Operator must perform a variety of job duties such as estimating weight of materials, and picking up, transporting, unloading and stacking materials.

F. "All-around" ability: Fork-Lift-Truck Operator's value to the employer involves a combination of the aspects of job performance listed above.

A reliability coefficient of .80 was obtained between the initial ratings and the re-ratings, indicating a significant relationship. Therefore, the final criterion score consists of the combined scores of the two ratings. The possible range for the final criterion is 12-60. The relationship between the criterion and age, education and job experience is shown in Table 4.

TABLE 4

Means, Standard Deviations (SD) and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Experience

	Total Sample			Mean	Mean Non-
	Mean	SD	r	Black	minority
Age (years)	36.7	10.6	.060	36.4	37.4
Education (years)	11.0	1.8	-.008	11.0	10.9
Experience (months on current job)	100.3	86.1	193**	103.3	100.5

**Significant at the .01 level

Criterion means, standard deviations and ranges are shown in Table 5 for the total sample and for the Black and nonminority subsamples.

TABLE 5

Criterion Means, Standard Deviations and Ranges

	Total Sample	Black Sample	Nonminority Sample
Mean	42.9	41.1	44.5
Standard Deviation	8.3	7.3	8.4
Ranges	17-60	22-60	17-59

About one-third of the workers are considered to be marginal workers. Therefore, the criterion distribution was dichotomized so as to include as close as possible to one-third of the sample in the low criterion group and the remainder in the high criterion group. The criterion cutting score was set at 39 which places 37% in the low criterion group and 63% in the high criterion group. It was not possible to place precisely one-third of the workers in the low criterion group because of the nature of the criterion distribution.

SAMPLE

The sample consisted of 201 males and 1 female employed as Fork-Lift-Truck Operators at various companies in Arkansas, California, Florida, Illinois, Kentucky, Michigan, Missouri, New Jersey, South Carolina, Texas and Wisconsin (see Appendix 1). A total of 107 were minority group members (91 Blacks, 14 Spanish Surnamed, 1 Oriental, and 1 French Canadian) and 95 were nonminority group members. The means and standard deviations for age, education and experience of sample members are shown in Table 4. Pre-employment tests (Wonderlic Personnel Test and Purdue Mechanical Adaptability Test) had been given to a small proportion of the sample; the remainder of the sample was nontest-selected. All workers had been employed at least 3 months in jobs with duties similar to those shown in the job description in Appendix 3.

STATISTICAL RESULTS

TABLE 6

Statistical Results for Total Sample

N=202

Aptitude	Mean	SD	Range	r
G - General Learning Ability	83.4	17.[illegible]	[illegible]6-131	.223**
V - Verbal Aptitude	85.7	12.5	[illegible]-135	.152*
N - Numerical Aptitude	82.8	21.0	[illegible]-142	.222**
S - Spatial Aptitude	89.4	18.7	58-150	.183**
P - Form Perception	88.7	23.6	29-146	.077
Q - Clerical Perception	96.3	16.2	57-151	.035
K - Motor Coordination	90.4	19.5	37-148	.202**
F - Finger Dexterity	82.0	22.6	27-151	.130
M - Manual Dexterity	90.1	22.7	32-157	.159*

*Significant at the .05 level
**Significant at the .01 level

TABLE 6a

Statistical Results for Black Subsample

N=91

Aptitude	Mean	SD	Range	r
G - General Learning Ability	74.7	13.5	46-111	.138
V - Verbal Aptitude	80.1	9.6	63-115	.049
N - Numerical Aptitude	72.1	19.1	30-121	.085
S - Spatial Aptitude	82.6	15.4	58-124	.181
P - Form Perception	78.3	23.9	29-131	.002
Q - Clerical Perception	89.5	15.2	57-139	.029
K - Motor Coordination	81.9	16.5	39-126	.063
F - Finger Dexterity	74.3	21.3	27-135	-.042
M - Manual Dexterity	80.0	20.1	32-137	-.005

TABLE 6b

Statistical Results for Nonminority Subsample

N=95

Aptitude	Mean	SD	Range	r
G - General Learning Ability	99.9	16.7	55-131	.114
V - Verbal Aptitude	99.7	12.8	66-135	.063
N - Numerical Aptitude	92.1	18.1	52-142	.146
S - Spatial Aptitude	94.7	18.4	61-140	.099
P - Form Perception	96.8	19.6	57-140	-.004
Q - Clerical Perception	101.5	14.9	66-151	.013
K - Motor Coordination	97.0	18.1	37-148	.238*
F - Finger Dexterity	86.4	21.5	37-151	.105
M - Manual Dexterity	91.7	23.4	32-157	.237*

*Significant at the .05 level

Table 7 summarizes the qualitative analysis and statistical results shown in Tables 3 and 6 and shows the aptitudes considered for inclusion in the battery. In addition to the aptitudes that had a significant correlation with the criterion, Aptitude Q was considered for inclusion in the battery since it was rated important on the basis of the qualitative analysis and the sample had a relatively high mean score on this aptitude.

TABLE 7

Summary of Qualitative and Quantitative Data for Total Sample

	Aptitudes							
Type of Evidence	V	N	S	P	Q	K	F	M
"Critical" on Basis of Job Analysis								
"Important" on Basis of Job Analysis			X		X	X	X	X
"Irrelevant" on Basis of Job Analysis								
Relatively High Mean					X	X		X
Relatively Low Standard Deviation	X							
Significant Correlation with Criterion	X	X	X	X		X		X
Aptitudes Considered for Inclusion in the Battery	G	V	N	S		Q	K	M

The information in Table 7 indicates that the following aptitudes should be considered for inclusion in the battery: G, V, N, S, Q, K and M. The objective is to develop a battery of 2, 3 or 4 aptitudes with cutting scores set at five point intervals at the point (a) where about the same percent will meet the cutting scores as the percent placed in the high criterion group and (b) which will maximize the relationship between the battery and the criterion. The cutting scores are set at approximately one standard deviation below the mean aptitude scores of the sample, with deviations above or below these points to achieve the objectives indicated above.

The following battery resulted:

Aptitudes	Cutting Scores
S - Spatial Aptitude	70
K - Motor Coordination	80

VALIDITY OF THE BATTERY

TABLE 8
Validity of Battery for Total Sample

	Below Cutting Scores	Meeting Cutting Scores	Total
High Criterion Group	28	99	127
Low Criterion Group	34	41	75
Total	62	140	202

Phi coefficient = .24
Significance level = P/2 < .0005

TABLE 8a

Validity of Battery for Minority Subsample

	Below Cutting Scores	Meeting Cutting Scores	Total
High Criterion Group	21	39	60
Low Criterion Group	26	21	47
Total	47	60	107

Phi coefficient = .20
Significance level = P/2 < .025

TABLE 8b
Validity of Battery for Black Subsample

	Below Cutting Scores	Meeting Cutting Scores	Total
High Criterion Group	20	30	50
Low Criterion Group	24	17	41
Total	44	47	91

Phi coefficient = .18
Significance level = P/2 < .05

TABLE 8c
Validity of Battery for Nonminority Subsample

	Below Cutting Scores	Meeting Cutting Scores	Total
High Criterion Group	7	60	67
Low Criterion Group	8	20	28
Total	15	80	95

Phi coefficient = .19 (Yates' corrected)
Significance level = P/2 < .05

OCCUPATIONAL APTITUDE PATTERN

This occupation was incorporated into OAP-26 in Section II of the 1970 edition of the Manual for the USES General Aptitude Test Battery with a "double asterisk" (**), because the battery did not contain the same aptitudes as included in OAP-26 but a significant phi coefficient was obtained between the criterion and the OAP-26 cutting scores of G-80, K-90 and M-80. A phi coefficient of .21 (P/2 < .005) was obtained.

APPLICABILITY OF BATTERY

The aptitude test battery may be used in the selection of inexperienced applicants for the job described in Appendix 3.

APPENDIX 1

COMPANIES CONTRIBUTING SAMPLES

American Can Company, Fort Smith, Arkansas
American Can Company, Anaheim, California
American Can Company, Darlington, South Carolina
American Can Company, Maywood, Illinois
American Can Company, Chicago, Illinois
American Can Company, Lexington, Kentucky
Continental Can Company, Chicago, Illinois
Continental Can Company, St. Louis, Missouri
Continental Can Company, Newark, New Jersey
Continental Can Company, San Jose and San Leandro, California
Nestle Company, Inc., Granite City, Illinois
Frigid Foods, Inc., Detroit, Michigan
Vlasic Foods, Inc., Imlay City and Bridgeport, Michigan
St. Regis Paper Company, Kansas City, Missouri
Rexall Drug Company, St. Louis, Missouri
General Services Administration, Kansas City, Missouri
Owens-Illinois, Riverside, California
Solo Cup Company, Santa Paula, California
Bendix-Westinghouse, Frankfort, Kentucky
Phelps Dodge Wire Corp., Hopkinsville, Kentucky
Owens-Illinois, Bardstown, Kentucky
Viking Bag Division, Pine Bluff, Arkansas
Georgia Pacific Corporation, Crossett, Arkansas
Hudson Pulp and Paper Company, Pine Bluff, Arkansas
American Warehouse Corporation, Jacksonville, Florida
Laney and Duke Warehouse, Jacksonville, Florida
Union Terminal Warehouse, Jacksonville, Florida
Silas Mason Company, Inc., Amarillo, Texas
WKH, Houston, Texas
Allis-Chalmers, Milwaukee, Wisconsin
Eaton Industries, Kenosha, Wisconsin
Stolper Industries, Menomonee Falls, Wisconsin

APPENDIX 2

U.S. DEPARTMENT OF LABOR • MANPOWER ADMINISTRATION

DESCRIPTIVE RATING SCALE

SCORE _____

RATING SCALE FOR _____

D.O.T. Title and Code

Directions: Please read the "Suggestions to Raters" and then fill in the items which follow. In making your ratings, only one box should be checked for each question.

SUGGESTIONS TO RATERS

We are asking you to rate the job performance of the people who work for you. These ratings will serve as a "yardstick" against which we can compare the test scores in this study. The ratings must give a true picture of each worker or this study will have very little value. You should try to give the most accurate ratings possible for each worker.

These ratings are strictly confidential and won't affect your workers in any way. Neither the ratings nor test scores of any workers will be shown to anybody in your company. We are interested only in "testing the tests." Ratings are needed only for those workers who are in the test study.

Workers who have not completed their training period, or who have not been on the job or under your supervision long enough for you to know how well they can perform this work should not be rated. Please inform the test technician about this if you are asked to rate any such workers.

Complete the last question only if the worker is no longer on the job.

In making ratings, don't let general impressions or some outstanding trait affect your judgment. Try to forget your personal feelings about the worker. Rate only on the work performed. Here are some more points which might help you:

1. Please read all directions and the rating scale thoroughly before rating.

2. For each question compare your workers with "workers-in-general" in this job. That is, compare your workers with other workers on this job that you have known. This is very important in small plants where there are only a few workers. We want the ratings to be based on the same standard in all the plants.

3. A suggested method is to rate all workers on one question at a time. The questions ask about different abilities of the workers. A worker may be good in one ability and poor in another: for example, a very slow worker may be accurate. So rate all workers on the first question, then rate all workers on the second question, and so on.

4. Practice and experience usually improve a worker's skill. However, one worker with six months' experience may be a better worker than another with six years' experience. Don't rate one worker as poorer than another merely because of a lesser amount of experience.

5. Rate the workers according to the work they have done over a period of several weeks or months. Don't rate just on the basis of one "good" day, or one "bad" day or some single incident. Think in terms of each worker's usual or typical performance.

6. Rate only the abilities listed on the rating sheet. Do not let factors such as cooperativeness, ability to get along with others, promptness and honesty influence your ratings. Although these aspects of a worker are important, they are of no value for this study as a "yardstick" against which to compare aptitude test scores.

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NAME OF WORKER (Print) (Last) (First)

SEX: MALE_____ FEMALE_____

Company Job Title: _____

How often do you see this worker in a work situation?

- ☐ All the time.
- ☐ Several times a day.
- ☐ Several times a week.
- ☐ Seldom.

How long have you worked with this worker?

- ☐ Under one month.
- ☐ One to two months.
- ☐ Three to five months.
- ☐ Six months or more.

A. How much can this worker get done? (Worker's ability to make efficient use of time and to work at high speed.) (If it is possible to rate only the quantity of work which a person can do on this job as adequate or inadequate, use #2 to indicate "inadequate" and #4 to indicate "adequate.")

- ☐ 1. Capable of very low work output. Can perform only at an unsatisfactory pace.
- ☐ 2. Capable of low work output. Can perform at a slow pace.
- ☐ 3. Capable of fair work output. Can perform at an acceptable pace.
- ☐ 4. Capable of high work output. Can perform at a fast pace.
- ☐ 5. Capable of very high work output. Can perform at an unusually fast pace.

B. How good is the quality of work? (Worker's ability to do high-grade work which meets quality standards.)

- ☐ 1. Performance is inferior and almost never meets minimum quality standards.
- ☐ 2. Performance is usually acceptable but somewhat inferior in quality.
- ☐ 3. Performance is acceptable but usually not superior in quality.
- ☐ 4. Performance is usually superior in quality.
- ☐ 5. Performance is almost always of the highest quality.

C. How accurate is the work? (Worker's ability to avoid making mistakes.)

- ☐ 1. Makes very many mistakes. Work needs constant checking.
- ☐ 2. Makes frequent mistakes. Work needs more checking than is desirable.
- ☐ 3. Makes mistakes occasionally. Work needs only normal checking.
- ☐ 4. Makes few mistakes. Work seldom needs checking.
- ☐ 5. Rarely makes a mistake. Work almost never needs checking.

D. How much does the worker know about the job? (Worker's understanding of the principles, equipment, materials and methods that have to do directly or indirectly with the work.)

- ☐ 1. Has very limited knowledge. Does not know enough to do the job adequately.
- ☐ 2. Has little knowledge. Knows enough to get by.
- ☐ 3. Has moderate amount of knowledge. Knows enough to do fair work.
- ☐ 4. Has broad knowledge. Knows enough to do good work.
- ☐ 5. Has complete knowledge. Knows the job thoroughly.

E. How large a variety of job duties can the worker perform efficiently? (Worker's ability to handle several different operations.)

- ☐ 1. Cannot perform different operations adequately.
- ☐ 2. Can perform a limited number of different operations efficiently.
- ☐ 3. Can perform several different operations with reasonable efficiency.
- ☐ 4. Can perform many different operations efficiently.
- ☐ 5. Can perform an unusually large variety of different operations efficiently.

F. Considering all the factors already rated, and only these factors, how good is this worker? (Worker's all-around ability to do the job.)

- ☐ 1. Performance usually not acceptable.
- ☐ 2. Performance somewhat inferior.
- ☐ 3. A fairly proficient worker.
- ☐ 4. Performance usually superior.
- ☐ 5. An unusually competent worker.

Complete the following ONLY if the worker is no longer on the job.

G. What do you think is the reason this person left the job? (It is not necessary to show the official reason if you feel that there is another reason, as this form will not be shown to anybody in the company.)

- ☐ 1. Fired because of inability to do the job.
- ☐ 2. Quit, and I feel that it was because of difficulty doing the job.
- ☐ 3. Fired or laid off for reasons other than ability to do the job (i.e., absenteeism, reduction in force).
- ☐ 4. Quit, and I feel the reason for quitting was not related to ability to do the job.
- ☐ 5. Quit or was promoted or reassigned because the worker had learned the job well and wanted to advance.

RATED BY	TITLE	DATE
COMPANY OR ORGANIZATION	LOCATION (City, State, ZIP Code)	

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APPENDIX 3

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JOB DESCRIPTION

Job Title: Fork-Lift-Truck Operator (any ind.) 922.883

Job Summary:
Drives liquid propane gas or gasoline-powered fork-lift truck of varying sizes to pick up, transport and stack palletized, boxed or packaged materials, parts, completed products, production, and packing materials to and from designated production, storage, shipping and receiving area.

Work Performed:
Obtains written or oral movement instructions from foreman or identifies parts to be moved.

Checks or estimates weight of all loads prior to pick up to prevent overloading. Visually checks load stability prior to pick up in order to avoid spillage and damage.

*Checks engine-operated gauges, moves levers and depresses pedals to drive truck and control movement of fork lift. Positions forks under loaded pallets, boxes or packaged materials and transports load to designated areas. Unloads and stacks materials by raising and lowering fork lifts.

Reports equipment defects to truck mechanic.

May prepare time card and daily load movement records.

*These job duties were designated as critical job duties. These duties are important since they must be performed competently if the job is to be performed in a satisfactory manner. Fork-Lift-Truck Operators spend about 80% of their working hours every day performing these job duties.

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